

Claims

1. A device for detecting environmental change of automobile windshield, where in: a plane capacitor is disposed on the inner surface of the windshield, two electrodes (1,2) of said plane capacitor are disposed on the same plane, the total area of said two electrodes (1,2) is less than 100 sq. centimetres, said plane capacitor is a sense element which detects the environmental change of the windshield surface and the environmental change after operating, said plane capacitor is electrically connected with a sensor detection circuit (3), the signal of capacitance changing which is affected by the outer environmental is transmitted to said sensor detection circuit (3), and said sensor detection circuit (3) is responsive to the change of capacitance to produce a control signal to control the equipment work.

2. A device for detecting environmental change of automobile windshield according to claim 1, wherein: said sensor detection circuit (3) includes a signal generator (31), a programme-controlled analog signal magnifier and filter circuit (32), an analog-to-digital conversion circuit (33) and a micro-processor (34); said signal generator (31) generates a testing signal (35) accessing to the plane capacitor; said testing signal of the plane capacitor (35) inputs said programme-controlled analog signal magnifier and filter circuit (32) to be magnified and filtered, and then generates a DC voltage signal, said DC voltage signal is converted to digital voltage signal by said analog-to-digital conversion circuit (33), then said micro-processor (34) receives said digital voltage signal and conduct digital filter, linearized digital processing and digital self-adaptive arithmetic adjustment to form digital output signal of the sensor controlling

the equipment work.

3. A device for detecting environmental change of automobile windshield according to claim 1, wherein: the shapes of electrodes of said plane capacitor could be rectangle, fan-shaped, triangle or polygon.

4. A device for detecting environmental change of automobile windshield according to claim 1, wherein: said plane capacitor is formed by two staggered pectinate electrodes (1, 2).

5. A device for detecting environmental change of automobile windshield according to claim 1, wherein: said two electrodes (1,2) of said plane capacitor are on the same plane, and said plane capacitor is formed by parallel wires according to a certain spacing in curve shape.

6. A device for detecting environmental change of automobile windshield according to claim 1 or 2 or 3 or 4 or 5, wherein: the conductive materials of the two electrodes (1, 2) of said plane capacitor could be copper, aluminium, silver, conductive rubber chip, conductive plastic, transparent conductive film or conductive rubber.

7. A device for detecting environmental change of automobile windshield according to claim 1 or 2 or 3, wherein: the two electrodes (1, 2) of said plane capacitor are respectively composed of various pieces of electrodes which are connected via leads.

8. A device for detecting environmental change of automobile windshield according to claim 1 or 2 or 3 or 4 or 5, wherein: the installation method of said plane capacitor is bonded, compression jointed or sprayed on the inner surface of automobile windshield (9).

9. A device for detecting environmental change of automobile windshield according to claim 2, wherein: said testing signal (35) could be sine-wave signal, square wave signal and triangle wave signal.

10. A device for detecting environmental change of automobile windshield according to claim 3 or 4, wherein: the area of said two electrodes (1, 2) of said plane capacitor is 10 ~ 20 sq. centimetres.

11. A device for detecting environmental change of automobile windshield according to claim 3 or 4, wherein: the space between said two electrodes (1, 2) of said plane capacitor is equal to the thickness of the windshield where they are placed.

12. A device for detecting environmental change of automobile windshield according to claim 5, wherein: the shapes of the two electrodes (1, 2) of said plane capacitor could be fold line, screw line and parallel line.

13. A device for detecting environmental change of automobile windshield according to claim 5, wherein: the space between said two electrodes (1, 2) of said plane capacitor is less than the thickness of the windshield where they are placed.

14. A device for detecting environmental change of automobile windshield according to claim 5, wherein: the line width of said two electrodes (1, 2) of said plane capacitor is less than 0.3mm.

15. A method for detecting environmental change of automobile windshield adopting the device which said in claim 1, including the following steps:

- a. Initialize detecting device;
- b. The signal generator (31) of the detecting device generates a testing signal (35) and the testing signal (35) is transmitted to the plane capacitor;
- c. Measure value variations of the testing signal (35);
- d. Transmit the testing signal (35) to the processing unit;
- e. The processing unit generates a control signal according to variations of the testing signal (35);
- f. Transmit control signals to the equipment;
- g. The detecting device re-detects the windshield surface, generates feedback signals and transmits to the processing unit, thus forms a close-loop control system.

16. A method for detecting environmental change of automobile windshield according to claim 15, wherein: the initialization detecting device detects and sets static initial value of the sense element of the plane capacitor according to materials and thickness of automobile windshield,

the area and installation means of sense element of the plane capacitor, environmental temperature and humidity conditions.

17. A method for detecting environmental change of automobile windshield according to claim 15, wherein: said testing signal (35) could be sine-wave signal, square wave signal or triangle wave signal.

18. A method for detecting environmental change of automobile windshield according to claim 17, wherein: the frequency of said testing signal is 100 kHz ~ 1000 kHz.

19. A method for detecting environmental change of automobile windshield according to claim 15, wherein: the static capacitance value of said plane capacitor is between 0.2~5pf.

20. A method for detecting environmental change of automobile windshield according to claim 15, wherein: the equipments controlled by control signals include rain wiper device and/or demisting device.